

PTO 1390 Page 1 of 1

US Dept. of Commerce Pat. & Trademark Office

Attorney's Docket No.

21714

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 USC 371

US. Application No. (if known)

09/743524

INTERNATIONAL APP. NO.
PCT/EP99/04578

INTERNATIONAL FILING DATE
2 July 1999

PRIORITY DATE CLAIMED
8 July 1998

TITLE OF INVENTION

LEVELLER BAR FOR COKING OVENS

APPLICANT(S) FOR DO/EO/US

Hans-Josef GIERTZ et al

Applicant herewith submits to the United States Designated/Elected Office (DO/EU/US) the following .

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 USC 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
3. ☐ This is an express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 317(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 USC 371(c)(2)).
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau.
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Patent Office.
6. ☒ A translation of the International application into English.
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 USC 371(c)(3)).
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau.
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 USC 371(c)(3).
9. ☒ An oath or declaration of the inventor(s) (35 USC 371(c)(4).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 USC 371(c)(5)).

Items 11. to 16. below concern documents or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An Assignment for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
 ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items of information.
Drawing (11 sheets)

17. The following fees are submitted:
Basic National Fee (37 CFR 1.492(a)(1)-(5):
Search report has been prepared by the EPO or JP \$860.00

Int'l prel. exam. fee paid to USPTO (37 CFR 1.482) \$690.00

No int'l prel. exam. fee paid to USPTO (37 CFR 1.482)
but int'l search fee paid to USPTO (37 CFR 1.445(a)(2)) \$710.00

Neither int'l prel. exam fee (37 CFR 1.482) nor
int'l search fee (37 CFR 1.455(a)(2)) paid to USPTO \$1000.00

Intl. prel. exam. fee paid to USPTO (37 CFR 1.482)
and all claims satisfied provisions of PCT Art. 33(2-4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT

CALCULATIONS PTO USE ONLY

\$1,000

Surcharge of \$130.00 for furnishing oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

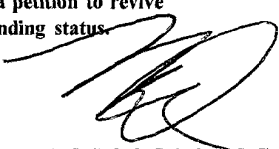
CLAIMS	NO. FILED	NO. EXTRA	RATE	
Total claims	22	2	\$18	\$36
Ind. claims	0	0	\$80	\$0
MULTIPLE DEP. CLAIM(S) (if applicable) (see prel. amt.)			270	
TOTAL OF ABOVE CALCULATIONS				\$1,036
Reduction of ½ for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (37 CFR 1.2, 1.27, 1.28)				\$0
SUBTOTAL				\$1,036
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				
TOTAL NATIONAL FEE				\$1,036
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The Assignment may be accompanied by an appropriate PTO-1595 cover sheet (37 CFR 3.28, 3.39)				\$40
TOTAL FEES ENCLOSED				\$1,076
				Amt to be refunded
				Amt to be charged

- a. ☒ A check in the amount of **\$1036** to cover the above fees is enclosed
☒ A check in the amount of **\$40** to cover recordal of the Assignment
 b. ☐ Please charge my deposit account 18-2025 **\$00.00** to cover the above fees. A copy of this sheet is enclosed.
 c: ☒ The commissioner is authorized to charge any additional fees which may be required or credit any overpayment to deposit account 18-2025. A copy of this sheet is enclosed

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:

The Firm of Karl F. Ross P.C.
5676 Riverdale Ave. Box 900
Riverdale (Bronx), NY 10471



Herbert Dubno, Reg. No. 19,752

IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor Hans-Josef GIERTZ et al
Patent App. Not known (US Nat'l phase of PCT/EP99/04578)
Filed Concurrently herewith
For LEVELLER BAR FOR COKING OVENS
Art Unit Not known
Hon. Commissioner of Patents
Washington, DC 20231

PRELIMINARY AMENDMENT

Prior to examination of the above-identified application,
please amend as follows:

In the Claims:

Claim 3, line 1, delete "or 2",

Claim 4, lines 1 and 2, delete "at least one of claims 1
to 3", insert instead -- claim 1 --,

Claim 5, lines 1 and 2, delete "at least one of claims 1
to 4", insert instead -- claim 1 --,

Claim 6, lines 1 and 2, delete "at least one of claims 1
to 5", insert instead -- claim 1 --,

Claim 7, lines 1 and 2, delete "at least one of claims 1
to 6", insert instead -- claim 1 --,

Claim 8, lines 1 and 2, delete "at least one of claims 1
to 7", insert instead -- claim 1 --,

Claim 9, lines 1 and 2, delete "at least one of claims 1 to 8", insert instead -- claim 1 --,

Claim 10, lines 1 and 2, delete "at least one of claims 1 to 9", insert instead -- claim 1 --,

Claim 11, lines 1 and 2, delete "at least one of claims 1 to 10", insert instead -- claim 1 --,

Claim 12, lines 1 and 2, delete "at least one of claims 1 to 11", insert instead -- claim 1 --,

Claim 13, lines 1 and 2, delete "at least one of claims 1 to 12", insert instead -- claim 1 --,

Claim 14, lines 1 and 2, delete "at least one of claims 1 to 13", insert instead -- claim 1 --,

Claim 15, lines 1 and 2, delete "at least one of claims 1 to 14", insert instead -- claim 1 --,

Claim 16, lines 1 and 2, delete "at least one of claims 1 to 15", insert instead -- claim 1 --,

Claim 17, lines 1 and 2, delete "at least one of claims 1 to 16", insert instead -- claim 1 --,

Claim 18, lines 1 and 2, delete "at least one of claims 1 to 17", insert instead -- claim 1 --,

Claim 19, lines 1 and 2, delete "at least one of claims 1 to 18", insert instead -- claim 1 --,

Claim 20, lines 1 and 2, delete "at least one of claims 1 to 19", insert instead -- claim 1 --,

Claim 22, line 1, delete "at least one of claims 1 to 20", insert instead -- claim 20 --.

Atty's 21714

Pat. App. Not known - US phase of PCT/EP99/04578

This preliminary amendment is submitted just to reduce
claim charges.

Respectfully submitted,
The Firm of Karl F. Ross P.C.



By: Herbert Dubno, Reg. No. 19,752
Attorney for Applicant

5 January 2001
5676 Riverdale Avenue Box 900
Riverdale (Bronx), NY 10471-0900
Cust. No.: 535
Tel: (718) 884-6600
Fax: (718) 601-1099
rg

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IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor Hans-Josef GIERTZ et al
Patent App. Not known (US Nat'l phase of PCT/EP99/04578)
Filed Concurrently herewith
For LEVELLER BAR FOR COKING OVENS
Hon. Commissioner of Patents
Washington, DC 20231

RECORD OF TRANSMITTAL--PCT APPLICATION

✓ PCT Transmittal
✓ PCT Application
✓ Translation
✓ Sheets of Drawing (11)
✓ PCT Declaration
✓ PCT Documents
✓ International Search Report
✓ Preliminary Amendment
✓ Assignment (with PTO-1595 and sep. check)
✓ Check for Official Fees
✓ Basic Fee (Large Entity) \$1000.00
□ Ind. claims in excess of 3 \$00.00
✓ 2 claims in excess of 20 \$36.00
Total \$1036.00

Please charge any fees not covered by an enclosed check to account 18-2025 of the undersigned.

5 January 2001

5676 Riverdale Ave. Box 900
Riverdale, NY 10471-0900
Tel: (718) 884-6600
Fax: (718) 601-1099
Customer No. 535
rg

Respectfully submitted,
The Firm of Karl F. Ross P.C.

Herbert Dubno, Reg. 19,752

09/745524

21714

Transl. of PCT/EP99/04578

JCO7 Rec'd PCT/PTO 05 JAN 2001

[TRANSLATION]

LEVELLING BAR FOR COKING OVENS

The invention relates to a levelling bar for coking ovens according to the preamble of claim 1.

5 From EP 0 483 497 B1 a levelling bar of this type is known and which comprises two mutually parallel cheeks extending in the longitudinal direction of the oven and composed of sheet metal, whereby in the space bounded by the cheeks at a uniform distance, transverse coal entrainers in the form of sheet metal walls of the height of the cheeks are arranged.

10 Shortly before the coal pile cone forming during the filling process and below the filling opening of the coke oven chamber reaches the gas collecting space which is to be maintained free, the levelling bar is inserted through the leveller door opening in the coke oven chamber and is moved back and forth to level out the coal pile cone. So that the free gas collection space above the coal is not blocked to a considerable extent, after the insertion of the levelling bar into the oven chamber during the filling process, the coal entrainers do not extend over the entire width of the intervening space between the two cheeks and the coal entrainers are alternately offset to one another and are arranged on one or the other of the two cheeks. The cheeks are thus interconnected by spacer bars.

20 With this levelling bar it has been found that during the levelling, in spite of the alternating spaces of the levelling bar between the cheeks and the free ends of the coal entrainers, these alternating spaces can be blocked by the coal to be levelled so

that the filling gas no longer can be sucked out unhindered to the collector. As a consequence, the emissions are more or less strongly uncontrolled since the filling gas is no longer freely sucked out via the riser pipe.

5 The invention presents the object of providing a levelling bar with which at all times during the levelling operation a sufficiently free gas channel is guaranteed in the gas collecting space and simultaneously a good degree of oven filling is guaranteed.

10 The solution of this object is given in the characterizing clause of claim 1.

 The dependent claims contain sensible embodiments thereof.

15 The levelling bar according to the invention affords the advantage that during the levelling process, a free gas channel is formed between the cheeks of the levelling bar in the intervening space and through which the filling gas can flow off unhindered horizontally to the riser pipe or to the collector.

20 This gas channel is especially dependently formed when, according to a further feature of the invention, the height of the coal entrainer is at most half the height of the cheeks.

25 Since the levelling bar is open at the front, it shifts into the coal pile cone and entrains the coal pile cone with the coal entrainers. There is no build up, like with known levelling bars, of a coal pile cone ahead of the levelling bar. So that the levelling bar will have a sufficient transport capacity, according to the invention, the number of coal entrainers is increased so that the transport capacity of the levelling bar according to the

invention has at least the transport capacity of the known levelling bar (EP 0 483 497 B1), the number of coal entrainers is at least so great so that the sum of all partial transverse web areas corresponds to the sum of the full transverse web area of the coal entrainers whose heights extend over the height of the cheeks.

At a maximum the number of coal entrainer should be that which gives a spacing of the coal entrainer corresponding to the heights thereof. With this embodiment to insure that the coal in all cases will fall through the coal entrainer into and through the cells formed by the coal entrainer. No coal bridges can build up on the coal entrainers.

Because of the increased number of coal entrainers with the levelling bar according to the invention, the transport capacity is increased so that with each back and forth movement of the levelling bar more coal is transported.

In this manner, continued formation of the coal pile cone under the filling openings is precluded to the greatest possible extent. When the levelling bar is moved with a higher frequency than has hitherto been customary in the oven chamber, pile cone formation in the levelling bar height is avoided.

The coal entrainer arranged one behind the other can also have different heights. With this configuration, high pile ups of coal ahead of the coal entrainers can be precluded. The coal falls over a coal entrainer of reduced height into the cell lying rearwardly of that coal entrainer without the build up of a pile of the coal. Thus it is insured that above the coal which overflows

the coal entrainer, a free gas channel is maintained within the levelling bar for carrying away the filling gas.

It is also possible to affix the coal entrainers at an angle deviating from the vertical to the cheeks of the levelling bar. Thus several coal entrainers can be arranged with their upper edges inclined toward the rear end of the levelling bar and other coal entrainers with their upper edges inclined toward the front end of the levelling bar. With the inclined arrangement toward the rear, the overflow of coal is facilitated during the forward movement of the levelling bar. If the coal entrainers are inclined forwardly, the coal in this region is somewhat pressed down and the levelling bar experiences a certain upward force. In addition, the inclined coal entrainers function as baffles during the filling process. The coal is passed through the coal entrainers from the filling holes into the regions between the filling holes. In this manner the coal pile cone formation is reduced.

It is also possible to arrange the coal entrainers so that they are movable. Thus, for example, a part of the coal entrainers can be movably mounted in their upper or lower regions on the cheeks of the levelling bar. With each forward or back displacement of the levelling bar they after their positions and level the coal in the corresponding inclined position. So that the coal entrainers cannot be oriented horizontally, the inclined positions can be limited by an abutment.

A further possibility resides in that the coal entrainers are configured like wedges. In that case, it is possible for the wedge point to be oriented upwardly or downwardly. Such a wedge

shape facilitates construction of the levelling bar since the wedge shaped coal entrainers enable reduction in the material thickness.

The cheeks of the levelling bar can also be configured with a wedge shape. In that case, the statics of the levelling bar are improved. When the wedge point is oriented downwardly toward the coal to be levelled, the coal cannot jam between the wedge shaped cheeks since the intervening space widens downwardly.

So that the force generated by the coal on the levelling bar will be reduced during the filling process, the upper edges of the cheeks and/or of the coal entrainers can be bevelled on one side or on both sides.

The levelling bar stroke, the levelling frequency, the number, spacing and heights of the coal entrainers must be mutually determined based upon the coal mass flow of the filling unit.

It is known that the levelling process below the filling holes of the oven chamber upon the coal pile cone results in pile cone stripes remaining between the chamber walls and the cheeks of the levelling bar. Apart from hindering the gas discharge, these coal pile stripes can give rise to graphite deposits in the coal collecting space in these regions. One possibility for avoiding these pile cone stripes is to impart a swinging movement or wobbling movement to the levelling bar during the levelling process. To achieve this, the support and guide rollers of the levelling bar can be configured with a bevel which generates the oscillating or wobbling movement of the levelling bar. Another possibility for avoiding the pile cone stripes is to form the mounting and guide rollers with a lateral shifting unit. Because

of this shiftability, the levelling bar during the levelling process eliminates the pile cone stripes on the two sides of the gas collecting space. The elimination of the pile cone stripes can be improved by providing outwardly extending ribs on the cheeks or forming them from corrugated sheet.

According to a further feature of the invention, the cheeks have openings. A lateral coal infall is possible through these openings into the cells formed between the coal entrainers. The effectivity of the levelling process is thereby enhanced.

The openings can be made sufficiently large that they are interrupted only by ribs on which the coal entrainers are fastened. The ribs also can be inclined.

The levelling bar, in this embodiment, is formed as a rectangular cellular girder in cross section which blocks the gas collecting space only to a minor extend during the levelling process. Thus a plugging of the gas collecting space with coal is especially effectively limited and the filling gases which are produced during the filling process can be carried off in the longitudinal direction of the oven unhindered. Because the cellular construction of the levelling bar, a lateral throughflow of the levelling bar, i.e. transverse, to the oven longitudinal direction is also possible.

The individual ribs which are arranged at the openings of the cheeks can be oriented at an angle to the cheeks. In this manner, coal on the sides of the coke oven chamber can be better stripped off.

The cheeks of the levelling bar can widen outwardly at their front ends.

In this configuration, the coal is stripped at the sides of the coke oven chamber at the levelling bar points directly.

5 According to a further feature of the invention, the levelling bar has at its front end one or more guide stirrups. The guide stirrups or guide stirrups serve to enable the levelling bar to be passed effectively through the leveler opening.

10 In this manner, the levelling bar can be inserted into the coal pile cone with its front end until the guide stirrup or guide stirrups open without the build up of a coal dam. The subsequent coal entrainer will then displace the coal pile cone and level the coal filling.

15 At the front end of the levelling bar or in the region of the cheek openings, movable coal scrapers can be arranged. Because of the effect of the forces of the coking coal on the coal scrapers during the backward movement of the levelling bar, the movable coal scrapers are pressed onto the walls of the coke oven chamber. In a new forward displacement of the levelling bar, the pile cone strips
20 are carried away from the furnace walls by the opened coal scrapers. Upon removal of the levelling bar from the oven chamber, the laterally swung out coal scrapers are brought into a closed position by the frame of the leveller opening. Upon insertion into the next oven chamber, the coal scrapers can facilitate insertion
25 as guide stirrups.

The levelling process can, according to the invention, be improved by the use of a gas under pressure.

For this purpose, fluid supply ducts are provided on the cheeks of the levelling bar with nozzles. The gas serves, in the first instance, to blow away the pile cone stripes which remain as the levelling bar passes through the coal pile cone. The nozzles
5 can be at the same level distributed over the levelling bar length one after the other and/or can be arranged one above another.

It is especially advantageous when the nozzles are combined with a levelling bar which has openings in the cheeks. Then the blown away coal can pass through the openings into the
10 intervening space between the cheeks and can be transported by the coal entrainers.

As has already been indicated, with the levelling bar of the invention a gas passage is guaranteed in the gas collecting space through which the filling gas can be sucked off. In the
15 region of the leveller opening of the respective oven chamber, however, there is the danger that false air will be sucked through the gas passage. Thus the invention provides that the levelling bar can be sealed by a sealing and guide box. This sealing and guide box should have baffle partition walls extending from above
20 until just above the coal entrainers and which are connected by a sealing plate and thus seal the gas passage. Under the levelling bar the sealing is completed by a sealing plate.

To further improve the sealing of the levelling bar, the levelling bar can be closed to form a housing which sealingly
25 engages the leveller door opening.

In the embodiment of the levelling bar in which the coal entrainers are of different heights, the sealing and guide box can

be equipped with hinges that allow the relevant partitions of the sealing and guide box to swing back and forth and thus compensate for the height difference of the coal entrainers. In addition, the movable partitions can be offset from the underpressure side so that the underpressure effect can be limited. To increase the sealing effect, several sealing and guide boxes can also be arranged one behind the other. Each sealing and guide box should be larger than the distance between the coal entrainers so that at least two coal entrainers are covered by the sealing and guide box.

To further enhance the gas channel formation, the coal entrainers can be provided with openings. The number of openings is optional so that, in an extreme case the coal entrainer is configured as a perforated sheet metal plate. Advantageously, openings are arranged in an upper portion of the coal entrainer or the openings in the upper portion are made larger. The gas passage between the cheeks are thus partially enlarged in the region of the coal entrainer. It is also possible to make the coal entrainer exactly as high as the cheeks and to form a gas passage by openings in the coal entrainers.

The aforementioned examples and the claimed features provided an inventive construction whose components with respect to dimensions, shapes, choice of materials and technical conceptions have no special limitations so that they can be used in the respective field with any known criteria in an unlimited manner.

Further details, features and advantages of the subject matter of the invention are given in the following description of the associated drawing in which, by way of example, preferred

embodiments of the levelling bar with gas passage are illustrated in the drawing:

FIG. 1 is a perspective view of a first embodiment of the levelling bar according to the invention;

5 FIG. 2 is a perspective view of a second embodiment of the levelling bar;

FIG. 3 is a side elevational view of parts of a third levelling bar with coal entrainers set at a bias;

FIG. 4 is a fourth embodiment of the levelling bar;

10 FIG. 5 is a plan view of the mounting and guide rollers of a levelling bar;

FIG. 6 is a shifting device for the mounting and guide rollers of a levelling bar;

15 FIG. 7 is a fifth embodiment of a levelling bar in a perspective illustration;

FIG. 8 is a plan view of a movable coal scraper of a levelling bar;

FIG. 9 is a side elevational view of a levelling bar with conduits and nozzles;

20 FIG. 10 is the arrangement of a sealing and guide box for a levelling bar; and

FIG. 11 is a sixth embodiment of a levelling bars with openings in the coal entrainers.

25 FIG. 1 shows a levelling bar of the cheeks 1 and coal entrainer 2 arranged between the cheeks 1. The heights 3 of the coal entrainers 2 are significantly less than the height H of the cheeks 1. The coal entrainers 2 are arranged one behind the other

at a spacing 5. Its cross bar area 4 covers only a minor part of the space between the cheeks 1 so that they form a free gas passage.

From FIG. 2 it is apparent that between the cheeks 1 coal entrainers 2 are arranged one behind the other and have different heights 3. In this embodiment it is advantageous that the first, lowest coal entrainer 2 does not cause a pile up of any coal hill ahead of it. The overflowing coal can fill into the next stage and is there further transported. Above the coal entrainer 2, at every point in time, a free gas passage 6 is provided.

FIG. 3 shows, for example, coal entrainers 2 which are affixed at angles deviating from the vertical on the cheeks 1. With the coal entrainers 2 during the filling process, the coking coal falling into the oven chamber is distributed in the oven and thus the pile cone formation is counteracted.

FIG. 4 shows a wedge-shaped embodiment of the coal entrainers 2 and the cheeks 1. With this arrangement a plugging of the transport cells formed between the coal entrainers by the coking coal is reduced since the throughflow area for the falling coal widens downwardly.

FIG. 5 shows the mounting of the levelling bar with the cheeks 1 and the coal entrainer 2. The mounting and guide rollers 8 have a bevel 7. The edges of the bearing and guide rollers 8 which guide the levelling bar, because of the bevel 7, at each rotation has a change in tracking as the levelling bar is moved back and forth. As a consequence, the levelling bar is laterally shifted during the levelling operation to eliminate possible pile

cone strip formation beneath the filling holes and between the cheeks 1 and the oven walls.

FIG. 6 shows bearing and guide rollers 8 which are laterally shiftable by a shifting device 9. As a consequence, it is also possible to impart a lateral movement to the levelling bar and spread out any pile cone strips which might be formed.

In FIG. 7, a levelling bar has been illustrated whose cheeks 1 have openings 11 through the openings 11, coal can fall into the transport cells of the levelling bar between the coal entrainers 2 and during the levelling stroke can be distributed. The openings 11 are bounded by ribs 12 on which the coal entrainer 2 are affixed. The ribs 12 can be arranged at an angle to the cheeks 1. As a result, the coal can be guided more effectively into the transport cells between the coal entrainer. On the cheeks 1, a guide stirrup 13 can be arranged which eases the introduction of the levelling bar into the leveller opening.

FIG. 8 shows that the front end of the levelling bar on the cheeks 1, movable coal scrapers 15 with the shanks 16 and 17 can be provided. The coal scrapers 15 rotate in a pivot 18. By the force generated by the coking coal during the rearward movement of the levelling bar, the coal scrapers 15 is pressed via the shanks 16 and 17 against the wall of the coke oven chamber. Upon withdrawal of the levelling bar out of the oven, the coal scrapers 15 are brought through the frame of the leveller opening into the closed position shown in the lower part of FIG. 8.

Upon insertion into the next furnace chamber, the coal scraper 15 assumes the function of a guide stirrup.

FIG. 9 shows that on the cheek 1 conduits 20 with nozzles 21 can be arranged. Through the nozzles 21, a gas under pressure, e.g. nitrogen can be blown in during levelling so that the lateral piled cone strips can be eliminated or can never form. The nozzles 21 can be arranged optionally. Upon blockage of the nozzles additional swinging or wobbling movements are generated.

From FIG. 10 it will be apparent that the gas passage 6 is sealed by a sealing and guide box 23. The gas passage 6 is largely sealed by a suspended sealing plate 25 of the sealing box 23 which is movable with the mounting shift 26 and the bulk heated walls 27. Below the cheeks 1 and the coal entrainer 2, a sealing plate 28 is provided. This plate 28 can be part of the housing 24 which increases the levelling bar and engages sealingly against the levelling door opening which has not been shown. By this sealing, undesirable air entry into the oven during the gas evacuation is avoided.

FIG. 11 shows coal entrainer 2 which have openings 29 and 30. Through the openings 29 and 30, the filling gas can emerge during the levelling process.

Reference Character List

	1	Cheeks
	2	Coal Entrainer
	3	Height
5	4	Cross Bar Area
	5	Spacing
	6	Gas Passage
	7	Bevel
	8	Bearing and Guide Roller
10	9	Shifting Device
	11	Openings
	12	Ribs
	13	Guide Stirrup
	15	Coal Scraper
15	16	Shank
	17	Shank
	18	Pivot
	19	Wall
	20	Fluid Supply Pipe
20	21	Nozzles
	23	Sealing and Guide Box
	24	Housing
	25	Sealing Plate
	26	Bearing Shaft
25	27	Bulk Heated Wall
	28	Sealing Plate
	29	Opening
	30	Opening
	H	Height

Patent Claims:

1. A levelling bar for a coking oven for spreading the coal pile cone formed during the filling process under the filling openings of the oven chamber, comprised of two substantially vertically arranged cheeks, like sheet metal plates (1), parallel to one another spaced apart in dependence upon the width of the oven chamber and extending substantially the full length of the oven chamber,, with coal entrainers (2) extending transversely and arranged one behind the other at a mutual spacing in the intervening space bounded by the cheeks, which extend only over a part of the cross sectional area of the levelling bar formed between the cheeks (1), characterized in that

the heights (3) of the coal entrainers (2) over the entire distance between the cheeks is less than the height (H) of the cheeks (1) and the cheeks above the coal entrainers (2) form a gas passage (6) which is substantially baffle free.

2. The levelling bar according to claim 1 characterized in that the height (3) of the coal entrainers (2) corresponds to at most half the height (H) of the cheeks.

3. The levelling bar according to claim 1 or 2 characterized in that the number of coal entrainers (2) is at least so great that the sum of all partial web surfaces (4) corresponds to the sum of all full web surfaces of coal entrainers (2) whose

5 heights extend above the height (H) of the cheeks (1).

1 4. The levelling bar according to at least one of claims
2 1 to 3 characterized in that the spacing (5) of the coal entrainers
3 (2) corresponds to the height (3) of the coal entrainers (2).

1 5. The levelling bar according to at least one of claims
2 1 to 4 characterized in that the coal entrainers (2) have different
3 heights (3).

1 6. The levelling bar according to at least one of claims
2 1 to 5 characterized in that the coal entrainers (2) are affixed to
3 the cheeks (1) at an angle deviating from the vertical.

1 7. The levelling bar according to at least one of claims
2 1 to 6 characterized in that the coal entrainers (2) are movably
3 fastened on the cheeks (1).

1 8. The levelling bar according to at least one of claims
2 1 to 7 characterized in that the cross sections of the coal
3 entrainers (2) are wedge shaped or otherwise profiled.

1 9. The levelling bar according to at least one of claims
2 1 to 8 characterized in that the cheeks are wedge shaped or
3 otherwise perforated.

1 10. The levelling bar according to at least one of
2 claims 1 to 9 characterized in that the support and guide rollers
3 (9) for the levelling bar have a bevel (7).

1 11. The levelling bar according to at least one of
2 claims 1 to 10 characterized in that the support and guide rollers
3 are laterally shiftable by a shifting device (9).

1 12. The levelling bar according to at least one of
2 claims 1 to 11 characterized in that the cheeks (1) have openings
3 (11).

1 13. The levelling bar according to at least one of
2 claims 1 to 12 characterized in that in the openings (11) ribs (12)
3 are arranged or ribs (12) laterally bound the openings (11).

1 14. The levelling bar according to at least one of
2 claims 1 to 13 characterized in that the ribs (12) are arranged at
3 an angle to the cheeks (1) deviating from 0°.

1 15. The levelling bar according to at least one of
2 claims 1 to 14 characterized in that the cheeks (1) of the
3 levelling bar widen outwardly at their front end.

1 16. The levelling bar according to at least one of
2 claims 1 to 15 characterized in that the cheeks (1) of the

3 levelling bar have guide stirrups (13) at their front ends.

1 17. The levelling bar according to at least one of
2 claims 1 to 16 characterized in that the cheeks (1) of the
3 levelling bar have movable coal scrapers.

1 18. The levelling bar according to at least one of
2 claims 1 to 17 characterized in that the fluid conduits (20) with
3 nozzles (21) are arranged on the cheeks (1).

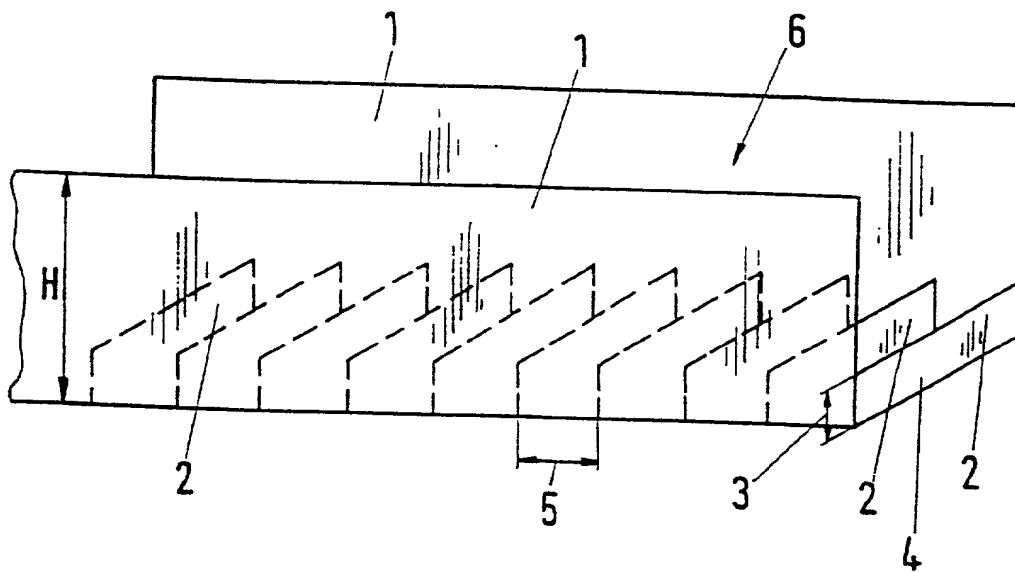
1 19. The levelling bar according to at least one of
2 claims 1 to 18 characterized in that the levelling bar is sealed
3 with one or more sealing and guide boxes (23).

1 20. The levelling bar according to at least one of
2 claims 1 to 19 characterized in that the sealing and guide boxes
3 (23) are provided with support corrugations.

1 21. The bar according to claim 20 characterized in that
2 at least one sealing and guide box (23) is provided with a housing
3 (24).

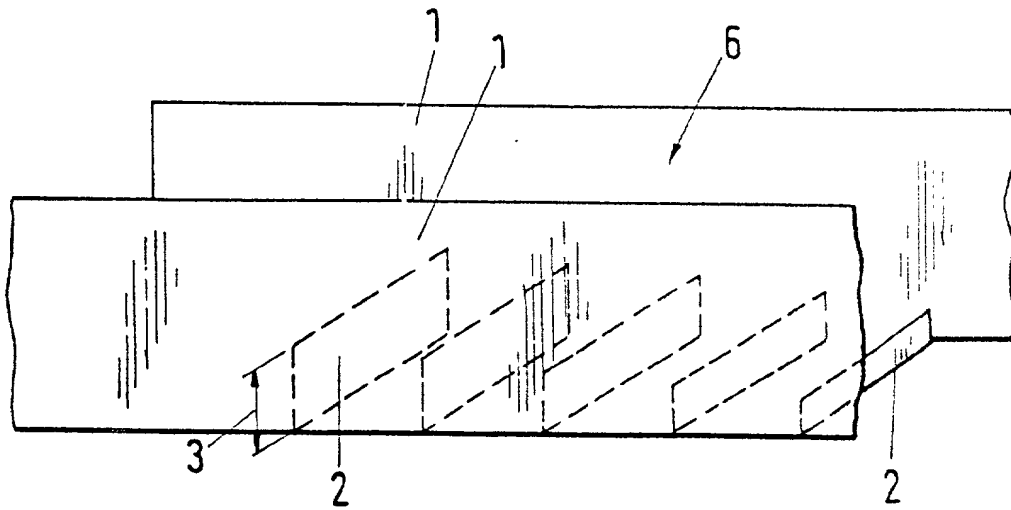
1 22. The bar according to at least one of claims 1 to 20
2 characterized in that the coal entrainers (2) have openings (29,
3 30).

Fig. 1



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Fig. 2



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Fig. 3

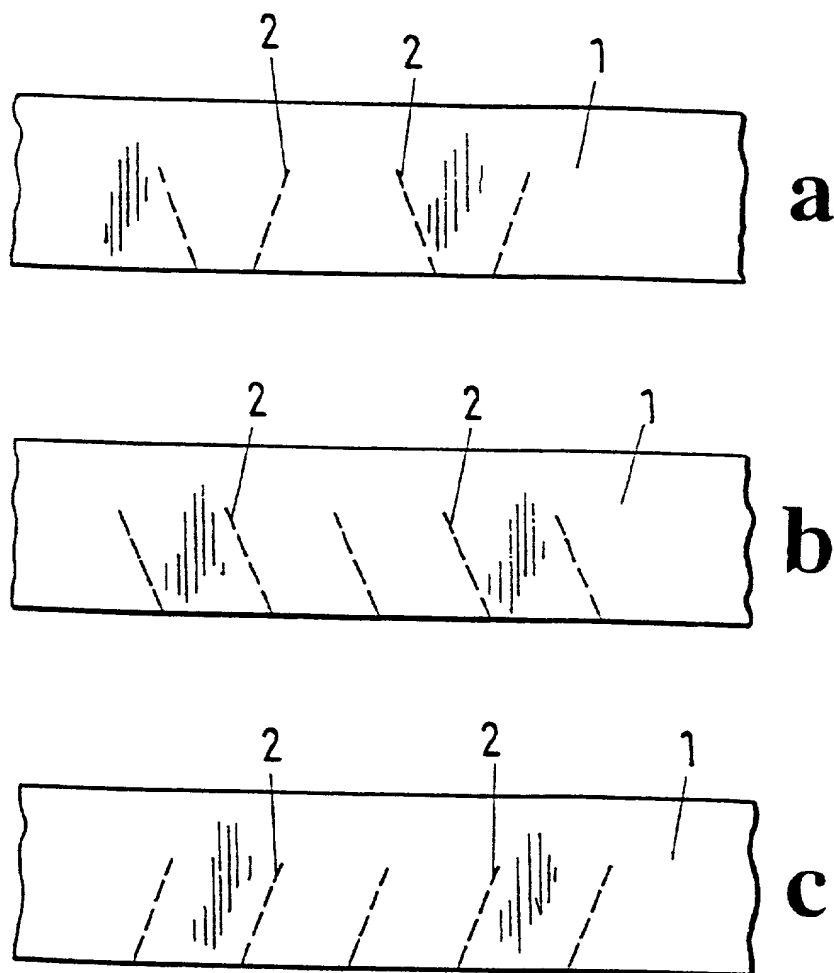


Fig. 4

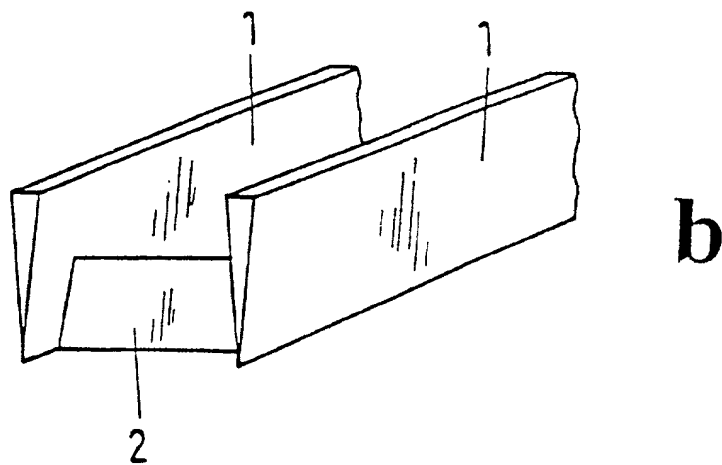
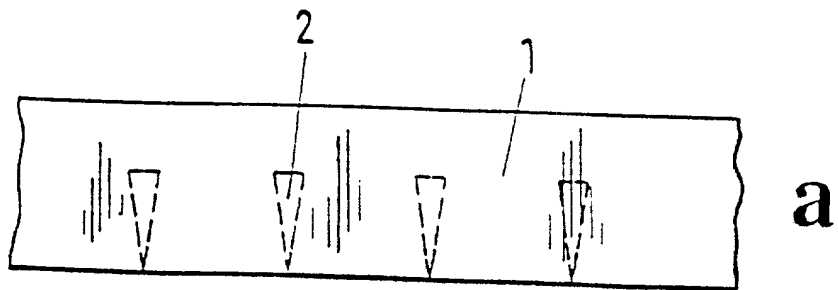


Fig.5

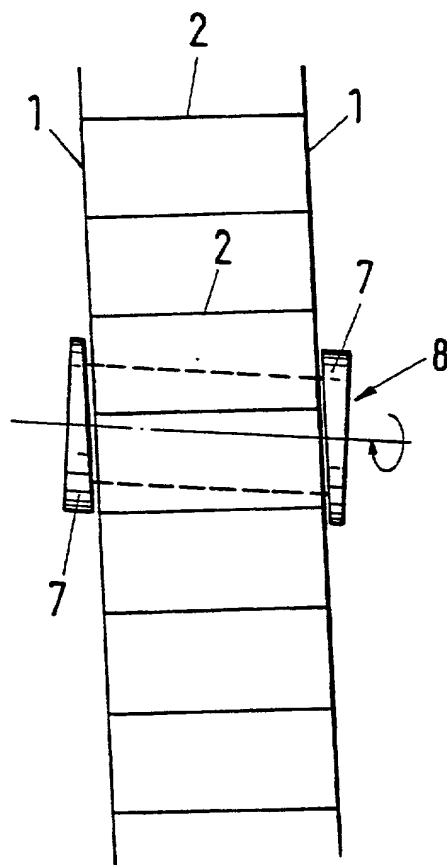


Fig. 6

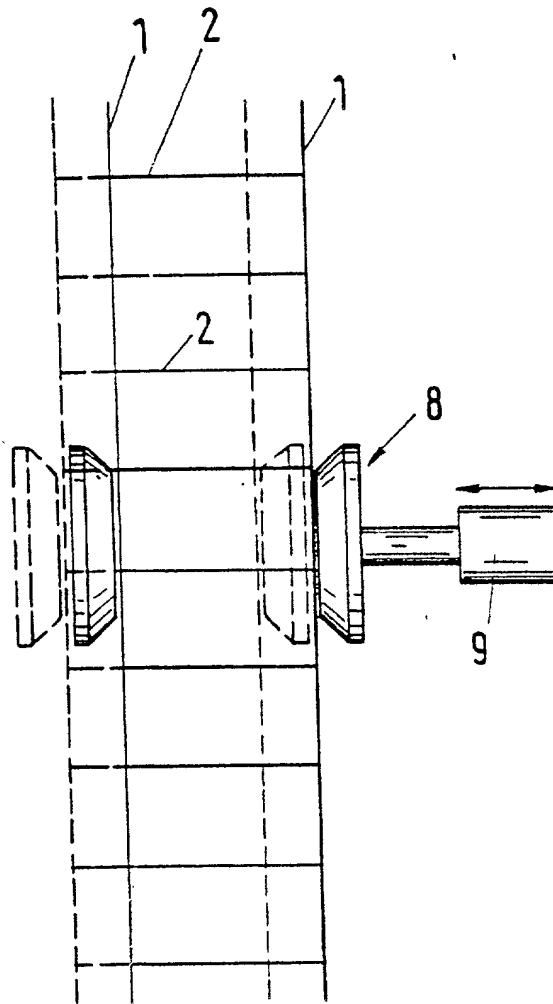
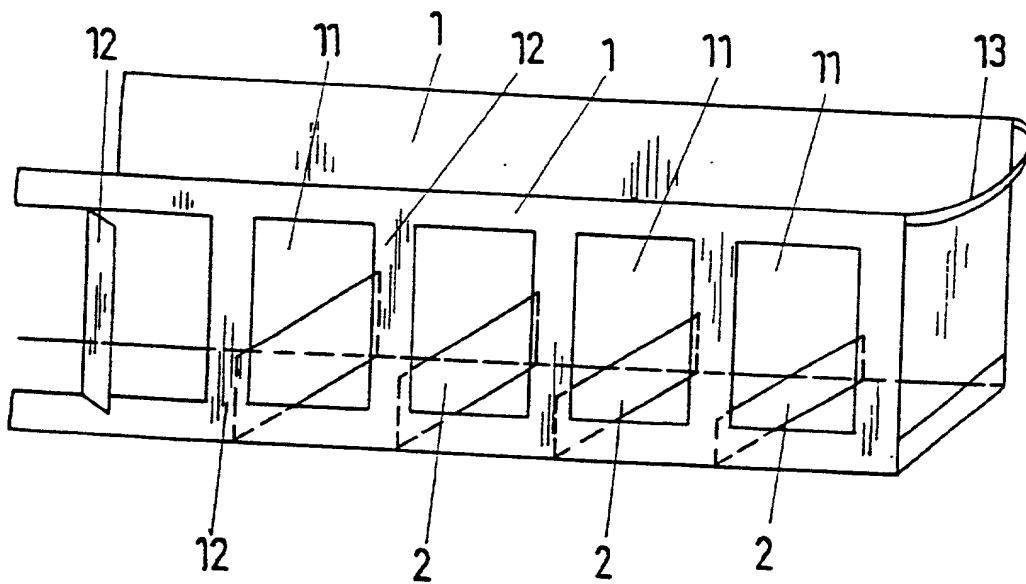
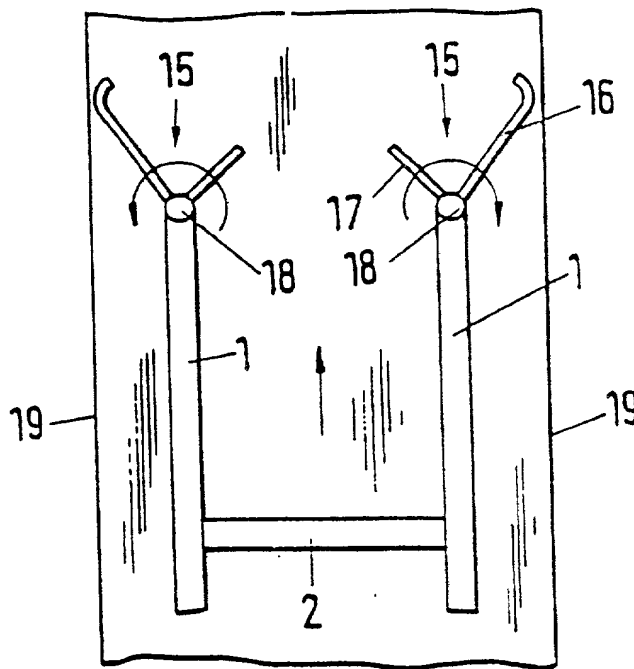


Fig. 7

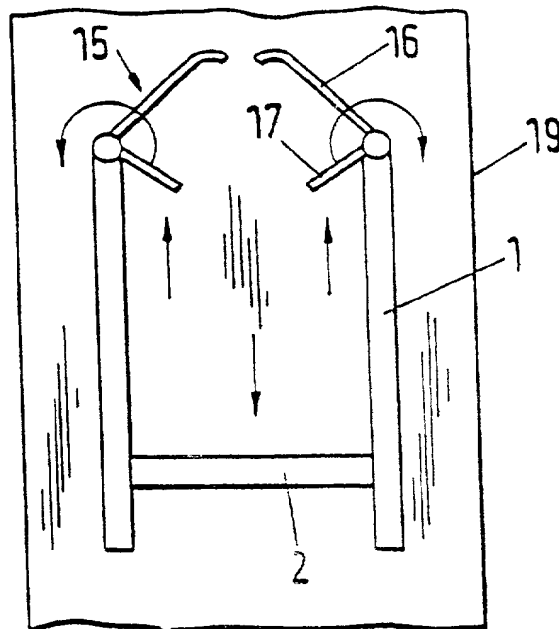


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Fig. 8

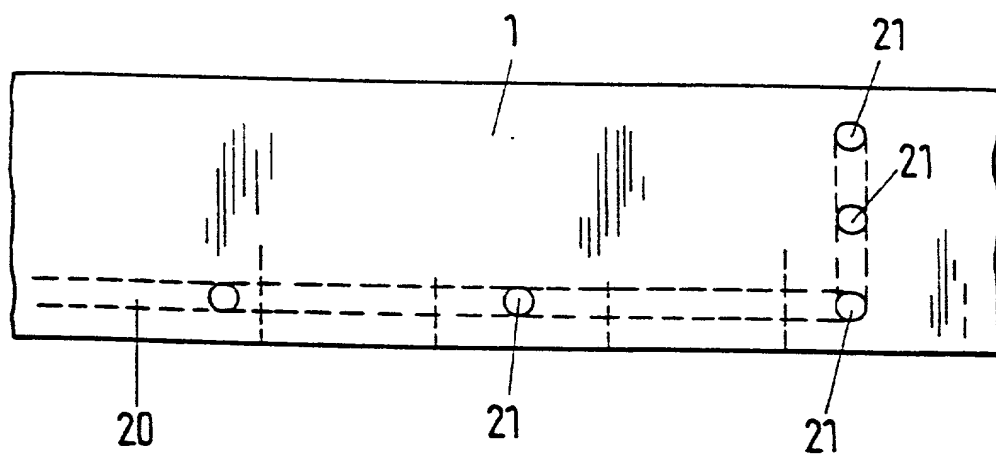


a



b

Fig. 9



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Fig.10

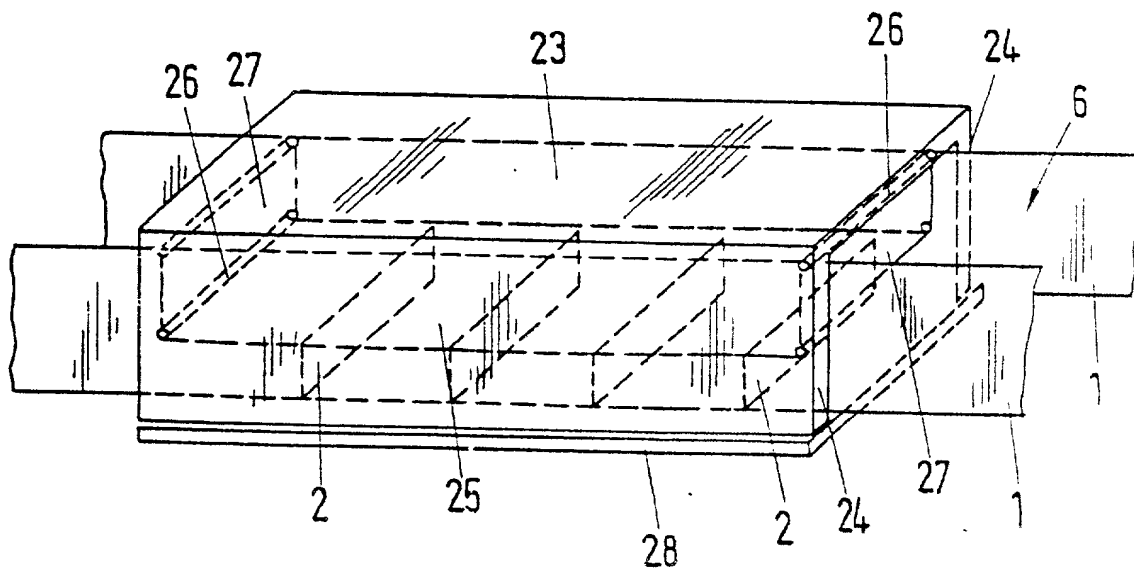
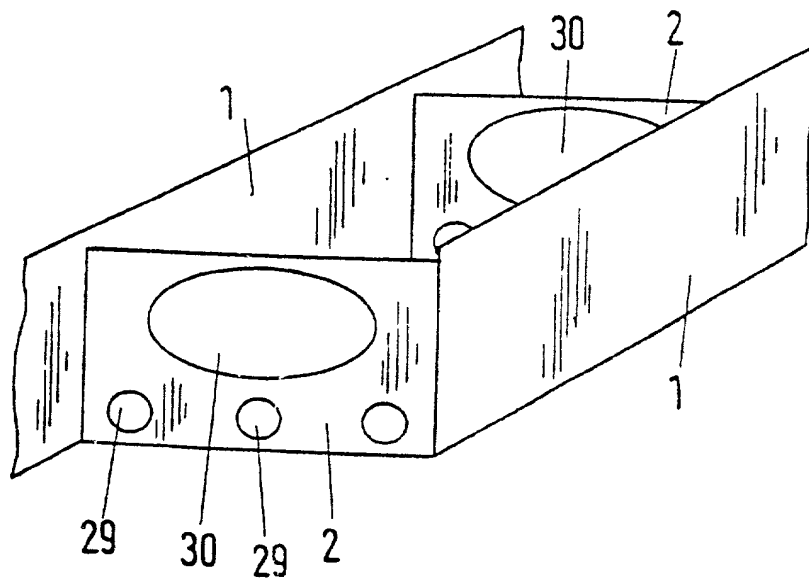


Fig. 11



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DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that: My residence, post-office address, and citizenship are as stated below next to my name.

I believe that I am an original joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled

LEVELLER BAR FOR COKING OVENS

the specification of which was filed on **2 July 1999** as PCT application **PCT/EP99/04578**.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 USC 119 of any foreign applications for patent or inventor's certificate listed below and have also identified below any foreign applications for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Applications

Country	Number	Filing Date	Priority claimed
DE	19830382.3	8 July 1998	Yes

I hereby claim the benefit under 35 USC 120 of the United States Application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States Application(s) in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose material information as defined in 37 CFR 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Serial Number	Filing Date	Status
PCT/EP99/04578	2 July 1999	Pending

I hereby appoint as attorneys to prosecute this application and to transact all business connected therewith: **Herbert Dubno, Reg. 19,752; Jonathan Myers, Reg. 26,963; Andrew Wilford, Reg. 26,597** and each of them individually.

Address all correspondence to:

The Firm of Karl F. Ross, P.C.
Customer Number 535

5676 Riverdale Avenue, Box 900
Riverdale (Bronx), New York 10471-0900
(718) 884-6600

Direct all telephone calls to:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or

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Ser. No. Not known - US phase of PCT/EP99/04578

both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first inventor:

Hans-Josef GIERTZ

Inventor's signature

Hans Josef Gertz

Date:

15.12.2000Residence: Ratingen, GermanyPost-office Address: Alter Kirchweg 37, Ratingen, Germany

Citizen of Germany

DEY

Full name of second inventor:

Jürgen GEORGE

Inventor's signature

J. George

Date:

19.12.2000Residence: Bochum, GermanyPost-office Address: Jägerhof 8, Bochum, Germany

Citizen of Germany

DEY

Full name of third inventor:

Klaus-Dieter RUTHEMANN

Inventor's signature

Klaus Dieter Ruthemann

Date:

18.12.2000Residence: Gelsenkirchen, GermanyPost-office Address: Essener Strasse 7, Gelsenkirchen, Germany

Citizen of Germany

DEY